The cover story in the December 12, 2008, issue of *Science* (**322**, 1650-1655) describes research conducted by an international team of scientists to understand how the orientation of the microtubule cytoskeleton in plant cells can regulate plant morphogenesis. Dr. Elliot Meyerowitz from the California Institute of Technology in collaboration with French and Swedish scientists focused on the development of the plant shoot apical meristem, a small group of undifferentiated, dividing plant cells that generate the aerial parts of a plant. Previous studies suggested that cortical microtubules, dynamic cytoskeletal filaments, guide the movement of transmembrane protein complexes that synthesize cellulose microfibrils, thus determining the direction of cellulose fiber deposition in the plant cell wall and affecting cell growth. By combining experimentation and computer modeling, Dr. Meyerowitz and colleagues detected the existence of a microtubule-based mechanical feedback loop in plant morphogenesis. Their research indicated that physical stress on plant cells during growth directs the precise organization and orientation of the microtubule cytoskeleton. Meristem cells grow at different rates, and thus exert different mechanical pressure on surrounding cells. As a consequence, different stress areas are created in the plant tissues. This study found that microtubules aligned parallel to the direction of the stress and similarly oriented the deposition of cellulose fibrils in the cell wall, providing cell rigidity and a preferred growth axis. In other words, microtubule organization guides cell shape and growth while cell growth results in mechanical forces that affect microtubule organization. The study by Dr. Meyerowitz and colleagues shows that morphogenesis and other biological processes, which are controlled by genes, proteins, and genetic networks, are intimately connected to physical sciences. Thus, an understanding of biological processes depends not only on knowledge of the genes and proteins but also of the physics of the system.